| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
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| 10/067,826 | 02/08/2002 | Juha Karunen | 3502-1006 | 9556 |

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|---|---|---|

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| ART UNIT | PAPER NUMBER |
|---|---|
| 2612 | |

DATE MAILED: 10/06/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

| | Application No. | Applicant(s) |
|---|---|---|
| **Office Action Summary** | 10/067,826 | KARUNEN ET AL. |
| | Examiner | Art Unit | |
| | Nelson D. Hernandez | 2612 | |

*-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --*

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE <u>3</u> MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.
- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
  Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

1)☒ Responsive to communication(s) filed on <u>20 July 2005</u>.

2a)☒ This action is **FINAL.**    2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

4)☒ Claim(s) <u>1-20</u> is/are pending in the application.

    4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) <u>1,4,5,7-9,12,13,15,16,19 and 20</u> is/are rejected.

7)☒ Claim(s) <u>2,3,6,10,11,14,17 and 18</u> is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

**Application Papers**

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on <u>28 February 2002</u> is/are: a)☒ accepted or b)☐ objected to by the Examiner.

    Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

    Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

    a)☐ All    b)☐ Some *  c)☐ None of:

      1.☐ Certified copies of the priority documents have been received.

      2.☐ Certified copies of the priority documents have been received in Application No. _____.

      3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

    * See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

1)☒ Notice of References Cited (PTO-892)

2)☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)

3)☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
    Paper No(s)/Mail Date _____.

4)☐ Interview Summary (PTO-413)
    Paper No(s)/Mail Date. _____ .

5)☐ Notice of Informal Patent Application (PTO-152)

6)☐ Other: _____.

## DETAILED ACTION

### *Response to Amendment*

1.      Examiner acknowledges amendments made on the claims received on July 20,

2005.  Claims 16-20 have been newly added.

### *Response to Arguments*

2.      Applicant's arguments filed on July 20, 2005 have been fully considered but they

are not persuasive.

Applicant contends the following:

a.      "Accordingly to COLBETH, the accumulated charge distribution is first

read from the CCD array regardless of the fact some of the pixels are known to

be defective. A pixel-specific correction word (Figure 9) used to post-process

each pixel value, and discrimination against the invalid values that originated

from defective pixels is only effected the decode/select 106 (column 9, lines 40-

45). Thus, the invalid pixel value gets processed from the output charge well and

moved into the processing chain, and only late in its propagation that the invalid

pixel value blocked. This well beyond the output charge well as recited in the

claims. COLBETH teaches that "binning" is effected even further along the

processing chain. See that Figure 8 that the averaging blocks 108 and 110, as

well as the buffer/filter block 112, effect what could be called the closest

equivalent the binning process of the present invention. Again, this is not as

recited.  Thus, COLBETH does not teach that charges from at least two pixels

are accumulated into the output charge well, with the pixels whose charges are  .

accumulated being determined on basis of the position(s) of said at least one

defected pixel. Therefore, this recitation of the independent claims not satisfied

by COLBETH or MCNEIL. The invention provides that discrimination against

invalid pixel values coming from defective pixels, as well as the whole concept of

binning, are effect very early in the processing chain. Most advantageously, the

invalid pixel values do not propagate any further than the output charge well".

"No pixel-wise correction needs to be attempted, and the invalid measurement

values never actually enter the whole detection and processing apparatus. This

takes care of collecting and arranging the measurement data read from the CCD

array. COLBETH does not make this teaching. Thus, the invention avoids

unnecessary processing operations and erroneous data kept from entering the

processing chain, which reduces the possibility of it being erroneously taken into

account in the processing valid values".

b.      "According to COLBETH, knowing that there are defective pixels does not

affect the size and shape of superpixels. See again column lines 40-45. If the

pixel value is known to be invalid because of a defective pixel, some corrective

data read from memory, so that the corrective data replaces the originally invalid

pixel value. This has no affect whatsoever on the averaging or "binning" made in

blocks 108, 110 and 112. These blocks operate completely without knowing

whether the measurement data includes (corrected) values from the defective

pixels or not. The teaching of COLBETH is to replace defective pixel data with

corrective data read from memory and then to process the replacement data just

like any other data. Note that COLBETH does not suggest to accumulate

charges of any pixels. COLBETH accumulates digital values that represent the

charges that have been read out and even corrected with the correction words

before any accumulating (or averaging as used in COLBETH) takes place. Quite

to the contrary, the present invention re-arranges the whole division of the pixel

array into superpixels so that the new superpixels only include valid read pixel

data and specifically excludes values from defective pixels. This is a

consequence of invalid pixel values being discriminated against the readout

process (the defective pixel values not propagating beyond the output charge

well)".

Regarding (a), Examiner agrees with the applicant in the sense that COLBETH

teaches that "binning" is effected even further along the processing chain, however,

COLBETH was not introduce to show that the charges from at least two pixels are

accumulated into the output charge well, since said limitation is disclosed by MCNEIL

(See MCNEIL, col. 11, lines 11-61; col. 20, line 49 – col. 21, line 5). COLBETH was

introduced to show that charges are accumulated are determined on the basis of the

positions of said at least one defected pixel in the sensor. Examiner noticed that the

charges in COLBETH are digitized and further processed to be accumulated to perform

the correction, however, since MCNEIL teaches that the charge coupled device (Fig.

2B: 203) can be configured to perform the "binning" prior to digitizing and processing,

Examiner believes that it would have been obvious one of ordinary skill in the art at the

time the invention was made to configure the charge coupled device in MCNEIL to

perform the method accumulating charges taught by COLBETH into the output charge well.

Regarding (b), Examiner agrees with applicant that in COLBETH the defective pixels does not affect the size and shape of the superpixels, however having the superpixels affected because of the presence of defective pixels is not present in the claim. Examiner agrees with the applicant in that the teaching of COLBETH is different from the invention because in COLBETH the invention is to replace defective pixel data with corrective data and then to process the replacement data just like any other data and the present invention re-arranges the whole division of the pixel array into superpixels so that the new superpixels only include valid read pixel data and specifically excludes values from defective pixels, however, "re-arranging the whole division of the pixel array into superpixels so that the new superpixels only include valid read pixel data and specifically excludes values from defective pixels" is not present in the claim. Furthermore, Examiner believes that accumulating the charges to perform defective pixel correction as taught by COLBETH reads on the claim as written, since the accumulation of pixel signals is made with the pixels adjacent to the detected defective pixel.

For the reasons above, the rejections made on the previous Office Action are maintained.

## *Claim Rejections - 35 USC § 103*

3.      The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all

obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set
> forth in section 102 of this title, if the differences between the subject matter sought to be patented and
> the prior art are such that the subject matter as a whole would have been obvious at the time the
> invention was made to a person having ordinary skill in the art to which said subject matter pertains.
> Patentability shall not be negatived by the manner in which the invention was made.

4.      **Claims 1, 4, 5, 7-9, 12, 13 and 15 are rejected under 35 U.S.C. 103(a) as**

**being unpatentable over McNeil, US Patent 6,800,452 B1 in view of Colbeth, US**

**Patent 6,424,750 B1.**

**Regarding claim 1**, McNeil discloses a method for measuring radiation from an

object (test samples as discussed in col. 2, lines 56-67; col. 7, lines 53-67; col. 11, line

65 – col. 12, line 8) with a charge coupled device (Fig. 2B: 203) comprising a matrix of

pixels arranged in rows and columns (Col. 11, lines 11-61; col. 20, line 49 – col. 21, line

5), in which method the radiation creates charges to the charge wells of the pixels (Col.

11, lines 11-61; col. 20, line 49 – col. 21, line 5), charges from a column of the pixels is

shifted to a serial register (Col. 11, lines 11-61; col. 20, line 49 – col. 21, line 5), the

charges in a serial register are shifted to an output charge well (Col. 11, lines 11-61; col.

20, line 49 – col. 21, line 5), the charge is measured from the output charge well and

charges from at least two pixels are accumulated into the output charge well (Figs. 3A-

3B teaches that the charges form the area 301 of the CCD are read out by binning the

pixels of the area 301 as discussed in col. 11, lines 11-61; col. 20, line 49 – col. 21, line

5, thus, it is taught that at least two pixels  are accumulated into the output charge well

of the CCD sensor of the camera 203 to produce the output result as shown in figs. 3A-

3B). McNeil does not explicitly disclose that the pixels whose charges are accumulated are determined on the basis of the positions of at least one defected pixel in the sensor.

However, Colbeth teaches an X-Ray imaging system that performs binning of analog pixel signals from a detector array (Fig. 2: 12 and fig. 3) by selectively summing, within the detector array, adjacent pixel charges on a row-by-row basis and selectively summing, within detector array readout circuits, the previously summed pixel charges (by rows) on a column-by-column basis, also teaches an array, or mapping, of defective pixel flags being used to identify defective pixels within the detector array, with such flags being added to, or inserted into, the incoming data stream for dynamic processing along with the incoming pixel data, wherein the charge of the pixels adjacent to the defective pixel is accumulated when interpolation is performed to correct said defected pixel based on the location of the defected pixel determined by the flag (Col. 4, line 49 – col. 5, line 44; col. 5, line 55 – col. 6, line 55; col. 8, line 66 – col. 9, line 46; col. 9, line 61 – col. 10, line 20).

Therefore taking the combined teaching of McNeil in view of Colbeth as a whole, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify McNeil by detecting the defective pixels in the sensor and accumulating the charges of the pixels adjacent to a detected defective pixel. The motivation to do so would help to correct the defective pixels by performing interpolation as suggested by Colbeth (Col. 9, line 61 – col. 10, line 20).

**Regarding claim 4**, the combined teaching of McNeil in view of Colbeth as applied to claim 1 teaches that the charges values of the output node are ignored, which

are distorted y at least one defected pixel (Colbeth teaches that accumulate the charges

of the non defective pixels to correct the defective pixel, thus, the charge of the

defective pixel is ignored, see Col. 9, line 61 – col. 10, line 20). Grounds for rejecting

claim 1, apply here.

**Regarding claim 5**, the combined teaching of McNeil in view of Colbeth as

applied to claim 1 teaches that the pixels that are accumulated and measured include

all pixels the of which not distorted by defected pixels in the readout process (Colbeth

teaches that accumulate the charges of the non defective pixels and then uses that

accumulated and measured data to correct the defective pixel, see Col. 9, line 61 – col.

10, line 20). Grounds for rejecting claim 1, apply here.

**Regarding claim 7**, the combined teaching of McNeil in view of Colbeth teaches

the same as in claim 1. Therefore, grounds for rejecting claim 1, apply here.

**Regarding claim 8**, the combined teaching of McNeil in view of Colbeth teaches

the same as in claim 1. Therefore, grounds for rejecting claim 1, apply here.

**Regarding claim 9**, McNeil discloses an arrangement for measuring radiation

(Test samples as discussed in col. 2, lines 56-67; col. 7, lines 53-67; col. 11, line 65 –

col. 12, line 8) comprising a charge coupled device (Fig. 2B: 203) with a matrix of

charge wells ranged in rows and columns of pixels (Col. 11, lines 11-61; col. 20, line 49

– col. 21, line 5), the arrangement also comprising: a serial register for receiving

charges from a column of the parallel register pixels (Col. 11, lines 11-61; col. 20, line

49 – col. 21, line 5), output well for receiving charges from the serial register (Col. 11,

lines 11-61; col. 20, line 49 – col. 21, line 5), means for measuring the charge from the

output well, and means for accumulating charges from at least two pixels (Figs. 3A-3B

teaches that the charges form the area 301 of the CCD are read out by binning the

pixels of the area 301 as discussed in col. 11, lines 11-61; col. 20, line 49 – col. 21, line

5, thus, it is taught that at least two pixels are accumulated into the output charge well of

the CCD sensor of the camera 203 to produce the output result as shown in figs. 3A-

3B). McNeil does not explicitly disclose that the pixels whose charges are accumulated

are determined on the basis of the positions of said at least one defected pixel in the

sensor.

However, Colbeth teaches an X-Ray imaging system that performs binning of

analog pixel signals from a detector array (Fig. 2: 12 and fig. 3) by selectively summing,

within the detector array, adjacent pixel charges on a row-by-row basis and selectively

summing, within detector array readout circuits, the previously summed pixel charges

(by rows) on a column-by-column basis, also teaches an array, or mapping, of defective

pixel flags being used to identify defective pixels within the detector array, with such

flags being added to, or inserted into, the incoming data stream for dynamic processing

along with the incoming pixel data, wherein the charge of the pixels adjacent to the

defective pixel is accumulated when interpolation is performed to correct said defected

pixel based on the location of the defected pixel determined by the flag (Col. 4, line 49 –

col. 5, line 44; col. 5, line 55 – col. 6, line 55; col. 8, line 66 – col. 9, line 46; col. 9, line

61 – col. 10, line 20).

Therefore taking the combined teaching of McNeil in view of Colbeth as a whole,

it would have been obvious to one of ordinary skill in the art at the time the invention

was made to modify McNeil by detecting the defective pixels in the sensor and accumulating the charges of the pixels adjacent to a detected defective pixel. The motivation to do so would help to correct the defective pixels by performing interpolation as suggested by Colbeth (Col. 9, line 61 – col. 10, line 20).

Regarding claim 12, the combined teaching of McNeil in view of Colbeth as applied to claim 9 teaches means for ignoring such charge values of the output node, which are distorted by at least one defected pixel (Colbeth teaches that accumulate the charges of the non defective pixels to correct the defective pixel, thus, the charge of the defective pixel is ignored, see Col. 9, line 61 – col. 10, line 20). Grounds for rejecting claim 9, apply here.

Regarding claim 13, the combined teaching of McNeil in view of Colbeth as applied to claim 9 teaches means for determining the groups of pixels that are selected to be accumulated and measured to include all pixels the charges of which are not distorted by defected pixels in the readout process (Colbeth teaches that accumulate the charges of the non defective pixels and then uses that accumulated and measured data to correct the defective pixel, see Col. 9, line 61 – col. 10, line 20). Grounds for rejecting claim 9, apply here.

Regarding claim 15, the combined teaching of McNeil in view of Colbeth teaches the same as in claim 9. Therefore, grounds for rejecting claim 9, apply here.

5.      **Claims 16, 19 and 20 are rejected under 35 U.S.C. 103(a) as being**

**unpatentable over McNeil, US Patent 6,800,452 B1 in view of Colbeth, US Patent**

**6,424,750 B1 and further in view of Kaifu, 6,497,084 B2.**

        **Regarding claim 16**, McNeil discloses a method for measuring radiation from an

object (test samples as discussed in col. 2, lines 56-67; col. 7, lines 53-67; col. 11, line

65 – col. 12, line 8) with a charge coupled device (Fig. 2B: 203) comprising a matrix of

pixels arranged in rows and columns (Col. 11, lines 11-61; col. 20, line 49 – col. 21, line

5), in which method the radiation creates charges to the charge wells of the pixels (Col.

11, lines 11-61; col. 20, line 49 – col. 21, line 5), charges from a column of the pixels is

shifted to a serial register (Col. 11, lines 11-61; col. 20, line 49 – col. 21, line 5), the

charges in a serial register are shifted to an output charge well (Col. 11, lines 11-61; col.

20, line 49 – col. 21, line 5), the charge is measured from the output charge well and

charges from at least two pixels are accumulated into the output charge well (Figs. 3A-

3B teaches that the charges form the area 301 of the CCD are read out by binning the

pixels of the area 301 as discussed in col. 11, lines 11-61; col. 20, line 49 – col. 21, line

5, thus, it is taught that at least two pixels  are accumulated into the output charge well

of the CCD sensor of the camera 203 to produce the output result as shown in figs. 3A-

3B).  McNeil does not explicitly disclose that the pixels whose charges are accumulated

are determined on the basis of the positions of at least one defected pixel in the sensor.

        However, Colbeth teaches an X-Ray imaging system that performs binning of

analog pixel signals from a detector array (Fig. 2: 12 and fig. 3) by selectively summing,

within the detector array, adjacent pixel charges on a row-by-row basis and selectively

summing, within detector array readout circuits, the previously summed pixel charges

(by rows) on a column-by-column basis, also teaches an array, or mapping, of defective

pixel flags being used to identify defective pixels within the detector array, with such

flags being added to, or inserted into, the incoming data stream for dynamic processing

along with the incoming pixel data, wherein the charge of the pixels adjacent to the

defective pixel is accumulated when interpolation is performed to correct said defected

pixel based on the location of the defected pixel determined by the flag (Col. 4, line 49 –

col. 5, line 44; col. 5, line 55 – col. 6, line 55; col. 8, line 66 – col. 9, line 46; col. 9, line

61 – col. 10, line 20).

Therefore taking the combined teaching of McNeil in view of Colbeth as a whole,

it would have been obvious to one of ordinary skill in the art at the time the invention

was made to modify McNeil by detecting the defective pixels in the sensor and

accumulating the charges of the pixels adjacent to a detected defective pixel. The

motivation to do so would help to correct the defective pixels by performing interpolation

as suggested by Colbeth (Col. 9, line 61 – col. 10, line 20).

The combined teaching of McNeil in view of Colbeth fails to teach that the

charges are accumulated are determined on the basis of the positions of at least one

defected pixel in the sensor so that the defective pixel values do not propagate beyond

the output charge well.

However, Kaifu teaches an image sensing apparatus (See fig. 1) having an X-ray

image sensing unit (Fig. 1: 111) and a mask table (Fig. 1: 115) for storing beforehand

the position of each defective pixel in the X-ray image sensing unit, wherein a switch

(Figs. 1: 114) disable the reading of pixel signals when a signal of a defective pixel is to be output based on said mask table (Col. 2, lines 43-64; col. 3, lines 10-24).

Therefore, taking the combined teaching of McNeil in view of Colbeth and further in view of Kaifu as a whole, it would have been obvious to one of ordinary skill in the art at the time the invention was made to turn disable the reading of pixel signals when a signal of a defective pixel is to be output based on a mask table having the position of each defective pixel in the X-ray image sensing unit stored beforehand. The motivation to do so would have been to prevent the read mode from being wastefully changed by the invalid area and defective pixel signals present in the sensor so as to collect only the useful signals prior digitizing and processing.

**Regarding claim 19**, the combined teaching of McNeil in view of Colbeth and further in view of Kaifu as applied to claim 16 teaches that the charges values of the output node are ignored, which are distorted y at least one defected pixel (Colbeth teaches that accumulate the charges of the non defective pixels to correct the defective pixel, thus, the charge of the defective pixel is ignored, see Col. 9, line 61 – col. 10, line 20). Grounds for rejecting claim 16, apply here.

**Regarding claim 20**, the combined teaching of McNeil in view of Colbeth as applied to claim 1 teaches that the pixels that are accumulated and measured include all pixels the of which not distorted by defected pixels in the readout process (Colbeth teaches that accumulate the charges of the non defective pixels and then uses that accumulated and measured data to correct the defective pixel, see Col. 9, line 61 – col. 10, line 20). Grounds for rejecting claim 1, apply here.

*Allowable Subject Matter*

6.      **Claims 2, 3, 6, 10, 11, 14, 17 and 18** are objected to as being dependent upon a

rejected base claim, but would be allowable if rewritten in independent form including all

of the limitations of the base claim and any intervening claims.

7.      The following is a statement of reasons for the indication of allowable subject

matter:

       **Regarding claims 2, 10 and 17**, the reasons for indication of allowable subject

matter is because the prior art fails to teach or reasonably suggest that the charge value

of the output node is read when charges of distorted value enter the charge well of the

serial register, which is closest to the output node.

       **Regarding claims 3, 11 and 18**, the reasons for indication of allowable subject

matter is because the prior art fails to teach or reasonably suggest that the charges

from the serial register are shifted to the output node when charge from a defected pixel

enters the pixel column of the parallel register, which is closest the serial register.

       **Regarding claims 6 and 14**, the reasons for indication of allowable subject

matter is because the prior art fails to teach or reasonably suggest that when any

charges in a group of pixels within one rectangular area is distorted in the readout

process by a defected pixel at least one subset group of pixels is formed wherein none

of charges in the subset group of pixels within said rectangular area is distorted in the

readout process by a defected pixel said subset group of pixels being accumulated as a

super pixel.

### Conclusion

8.      Applicant's amendment necessitated the new ground(s) of rejection presented in

this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP

§ 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37

CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE

MONTHS from the mailing date of this action. In the event a first reply is filed within

TWO MONTHS of the mailing date of this final action and the advisory action is not

mailed until after the end of the THREE-MONTH shortened statutory period, then the

shortened statutory period will expire on the date the advisory action is mailed, and any

extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of

the advisory action. In no event, however, will the statutory period for reply expire later

than SIX MONTHS from the date of this final action.

### Contact

Any inquiry concerning this communication or earlier communications from the

examiner should be directed to Nelson D. Hernandez whose telephone number is (571)

272-7311. The examiner can normally be reached on 8:30 A.M. to 6:00 P.M..

If attempts to reach the examiner by telephone are unsuccessful, the examiner's

supervisor, Ngoc Yen Vu can be reached on (571) 272-7320. The fax phone number

for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the

Patent Application Information Retrieval (PAIR) system. Status information for

published applications may be obtained from either Private PAIR or Public PAIR.

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For more information about the PAIR system, see http://pair-direct.uspto.gov. Should

you have questions on access to the Private PAIR system, contact the Electronic

Business Center (EBC) at 866-217-9197 (toll-free).

Nelson D. Hernandez
Examiner
Art Unit 2612

NDHH
October 2, 2005

NGOC-YEN VU
PRIMARY EXAMINER